Understanding poverty in cash-crop agro-forestry systems: evidence from Ghana and Ethiopia

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Abstract

This paper examines the linkages between cash-crop income and other dimensions of poverty to interrogate assumptions regarding the relationship between agricultural income and poverty alleviation. The analysis treats poverty as a multi-dimensional and socially disaggregated phenomenon. The paper employs a mixed methods approach to case studies of Ghana and Ethiopia to explore two critical issues. First, how income from cash crops is linked with other dimensions of poverty. Second, how income and land are socially disaggregated. The paper then draws on qualitative data to critically reflect on how poverty is understood within studied communities. The results show that some, but not all, indicators of poverty vary across income quartiles and that significant differences exist across social groups. The analysis suggests that although cash crops are essential, focusing on increasing income from cash crops will not necessarily have a predictable or progressive impact on wellbeing. Furthermore, the analysis highlights how contextual factors, such as the provision of communal services, the nature of land holdings and the quality of local governance mediate the potential poverty alleviating outcomes of income increases. Future development of sustainable intensification strategies should focus on the prevalence of trade-offs and the fundamental social relations underpinning poverty dynamics.

Keywords: Poverty, Agriculture, Ghana, Ethiopia, Cocoa, Coffee

1 Introduction

In the decade since the World Bank published its Annual Report on Agriculture and Development (Bank, 2007), sustainable intensification has emerged as a critical area of policy focus (Campbell et al., 2014; Caron et al., 2014; Garnett et al., 2013; Godfray and Garnett, 2014; Tittonell, 2014; Vanlauwe et al., 2014). Central to this agenda has been the pursuit of addressing yield gaps, i.e. gaps between the realized and potential per hectare yield of a given crop, to both minimise the pressure agriculture exerts on land and to alleviate poverty (Dzanku et al., 2015; Tittonell and Giller, 2013). However, there has been limited engagement between work on the sustainable intensification of agriculture and more nuanced understandings of poverty as a multi-dimensional and socially disaggregated phenomenon (Alkire and Foster, 2011; Bourguignon and Chakravarty, 2003; Daw et al., 2011; Green and Hulme, 2005; Mosse, 2010; Sandhu and Sandhu, 2014; Shepherd, 2011). Against this background, this paper aims to address this gap by examining two key elements of poverty and production. First, the paper explores the relationship between income from key cash crops (cocoa in Ghana and coffee in Ethiopia) and other dimensions of poverty. Second, the paper considers how key dimensions of poverty are socially disaggregated. Thus the paper considers the extent to which addressing agricultural incomes, through sustainable intensification for example, can reduce poverty in rural farming households.

Despite growing appreciation that increases in agricultural productivity, ecological health and poverty alleviation are often characterised by trade-offs (Howe et al., 2014; Power, 2010; Rodríguez et al., 2006; Zhang et al., 2007), terms such as ‘agricultural development’ and ‘sustainable intensification’ continue to gain traction in discourse because of their ‘euphemistic qualities’ and ‘normative resonance’ (Cornwall, 2007:472). This deflects attention away from a precise and detailed analysis of what strategies promoted in their pursuit actually entail and the distributional

issues that are associated with agricultural interventions (Harris and Orr, 2014). These concerns permeate a range of agriculture and development debates, including: the relative importance of agriculture and non-agricultural activities for alleviating poverty (Christiaensen et al., 2011; Diao et al., 2010; Dorosh and Thurlow); the benefits, costs and possibilities entailed by promoting either large- or small-scale farming (Collier and Dercon, 2014; Hazell et al., 2007; Wiggins et al., 2010); and the importance of subsistence crops for food security compared to cash-crops for export (Anderman et al., 2014; Govereh and Jayne, 2003; Herrero et al., 2014; Michler and Josephson, 2017).

Developing a more sophisticated knowledge base upon which agricultural development policy can be developed requires addressing two critical questions: what kind of poverty is being alleviated, and for whom. Engaging with these questions requires detailed research that goes beyond analysing aggregated large-scale data sets at a national-level that equate income with poverty. Moving beyond an income-based conceptualisation of poverty towards a multi-dimensional understanding highlights the difference between stochastic and structural poverty, which is particularly important in agricultural settings (Morduch, 1994). Stochastic poverty refers to components of poverty that fluctuate, in part, to factors beyond the control of the household, e.g. droughts or floods impacting agricultural yields and incomes; while structural poverty refers to individuals or households that lack access to productive assets, such as land, and often underpins persistent or chronic poverty (Adato et al., 2006; Carter and Barrett, 2006; Carter and May, 2001; McKay, 2013; Nielsen et al., 2012; Radeny et al., 2012). This paper categorises different dimensions of poverty as either structural or stochastic, and within the structural component further distinguishes between dimensions which are dependent on communal provision of infrastructure (such as the provision of healthcare facilities) or are experienced on an individual or household level (such as access to land). This framing helps clarify the relationship between agricultural cash-crop income and the different dimensions of poverty.

The rest of the paper is organised as follows. The next section introduces the case studies and describes and justifies the methods employed. After providing an overview of summary statistics, Section 3 describes the key results in three sections. First the relationship between income from agro-forestry cash crops and other key dimensions of poverty is described by comparing indicators of different dimensions across income quartiles. Second the social disaggregation of key poverty dimensions (income and land) is assessed across difference social groups (gender, age, and ethnicity). And third, the primarily quantitative analysis is supplemented with a qualitative analysis that widens the scope of inquiry to provide a broader and richer narrative of how the research participants understand poverty and the contextual factors that shape the dynamics of poverty in the study sites. Section 4 reflects on the implications of the insights this mixed methods analysis provides, particularly with respect to ongoing agriculture-development debates, especially focussing on evolving sustainable intensification strategies that focus on increasing incomes through increasing yields.

2 Methods and materials

2.1 Study sites and sample

This analysis draws on data collected from sites in Ghana and Ethiopia (see Figure 1) during several field trips in 2015. Cocoa and coffee respectively are central to the economy of each country and both countries aim to sustainably increase production in the coming years (Abdu, 2015; Asare, 2014; COCOBOD, 2014). The cases were selected to illustrate and explore the range of possible linkages between cash-crops and poverty in agro-forestry systems, rather than for direct comparison.

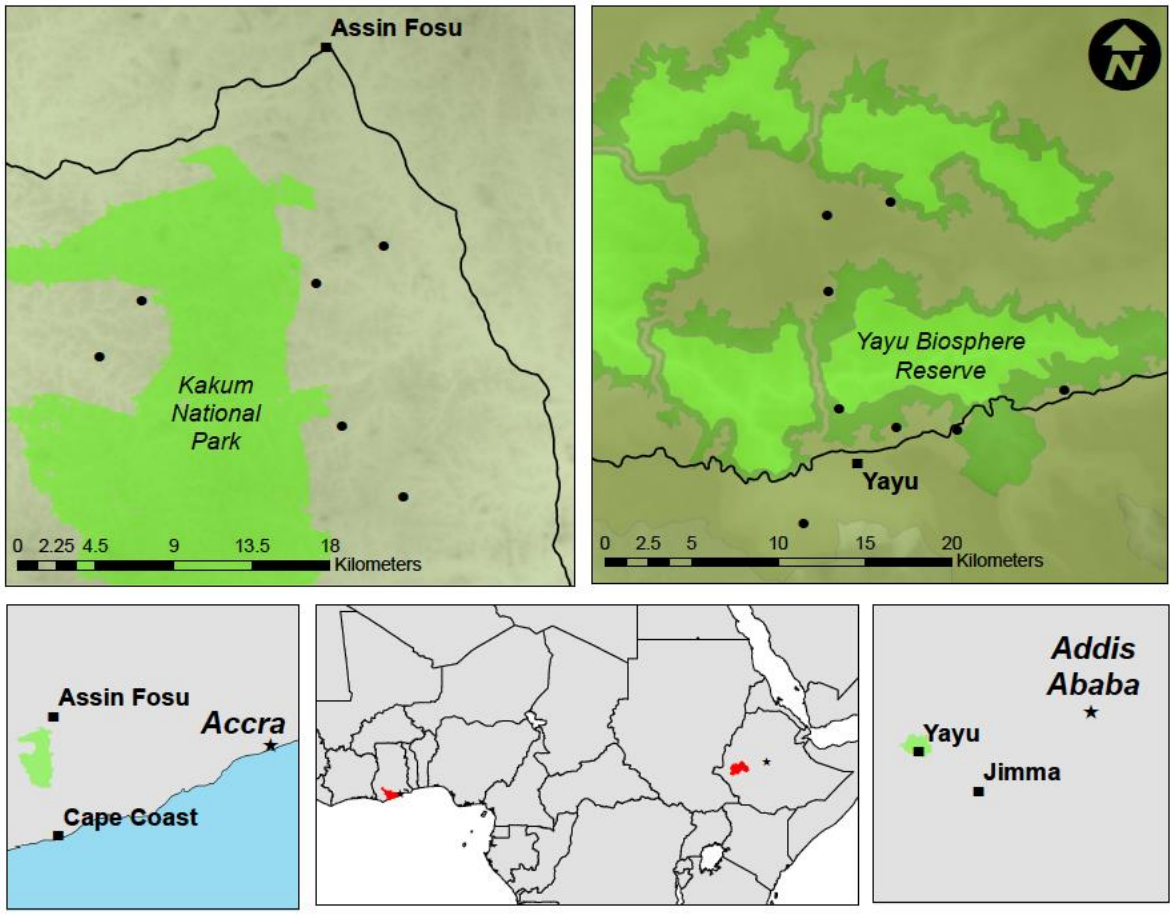

Figure 1. Map showing study sites. Circles represent approximate location of studied villages. Squares represent major settlements and starts the capital cities of Ghana (left) and Ethiopia respectively (right).

In Ghana, data were collected from 6 forest fringe communities in the Assin South District in the Central Region. The landscape is dominated by the heavily protected Kakum National Park and the surrounding communities that have been established for around 50-80 years, and are predominantly small-holder farmers growing cocoa, oil palm and vegetables. Most land is owned by the traditional authorities, but private land also exists. A variety of tenurial arrangements exist in the area including caretaker farmers and landlords, and farmers who own their own land.

In Ethiopia, data were collected from 9 Kebeles (Villages) from 2 Woredas (Districts) in the Illubabor zone in Oromia which is in the south west of the country. One of the Woredas is a long-settled area on the main road between two major urban centres, and the other has a recent history of growth

since the 1980s when migrants from elsewhere in Ethiopia arrived in response to famine and political upheaval. The area hosts the Yayu Coffee Forest UNESCO Biosphere Reserve recognized and listed by UNESCO in 2010 on the list of the World Network of Biosphere Reserves, with the primary objective of protecting wild coffee (*Coffea arabica*) genetic resources as well as other natural and cultural heritage. The landscape is dominated by shade-grown coffee, other food crops, livestock and, increasingly, chat (*Catha edulis*). All land in Ethiopia is owned by the Federal state and farmers are vested with use-rights. At a local level, Kebele managers (unelected) and chairmen (locally elected) play a key role in distributing available land. Recent efforts to provide farmers with formal certificates of use-rights under the Rural Land Administration Programme (RLAP) have not yet been implemented in the area, at the time of writing, according to officials from the Rural Land Administration and Environmental Protection Bureau. These sites provide a basis for contrasting the characteristics of poverty in cash-crop systems in contexts which vary across crops, and across national political, economic and social contexts. The current study focuses on a local level analysis. However, we recognise that local dynamics are embedded in much wider sets of social, economic and political relations.

In both countries villages were sampled spatially with respect to their distance to forests or forest patches. Sampled villages lay on a distance gradient between approximately 1km from forest edge to approximately 5km from the forest. Within the sampled villages, households were randomly sampled (stratified by gender of household head and, in Ethiopia, wealth level,[1] Ghana n = 108; Ethiopia n = 240). These household surveys were supplemented with a series of focus groups with farmers selected for their in-depth knowledge of the communities and the challenges they face (Ghana n = 12, 6 of which were male only participants, 6 of which were female only participants; Ethiopia n = 4, 2 mixed, 1 male only participants, 1 female only participants), key informant interviews with farmers (Ghana n = 36; Ethiopia n = 20), purposively selected government officials (Ghana n = 28; Ethiopia n = 52) and ethnographic observations undertaken by in-country field assistants who recorded information on the factors influencing poverty and agricultural practices among individuals and households in the communities. Together these data provide insights into the dynamics of poverty that are hard to capture in a cross-sectional data set. Differences in the emphasis of data collection between countries reflect differences in social contexts, available research assistance and logistical constraints. The following section describe these methods in detail.

2.2 Interviews and focus groups

The data generated from focus groups and semi-structured interviews with key stakeholders (see above) were used to inform the design of the survey and to contextualise, interpret and explain the results.

The focus group discussions included components on history, mapping, agriculture, poverty and the future. First, the history of communities and life history of participants were discussed. Then a participatory mapping exercise was conducted to identify features such as water holes, markets, health clinics, religious buildings and forested land. This allowed for a discussion on what was considered important, what was available, and provided participants with an opportunity to inform

[1] Household lists including the gender of the household-head of each community was compiled by community leaders. In Ethiopia, Kebele committees also identified households as either poor, neither poor nor rich, or rich, and this framework guided proportionally representative sampling. In Ghana, community leaders were unwilling to identify households by wealth level and therefore the sample was only stratified by gender of household head.

the agenda of the research. Participants then discussed agricultural activities, the benefits they provide and the challenges faced. Topics addressed included land tenure, inheritance (including gendered differences), on-farm tree management, labour dynamics, extension and credit. The deliberations on poverty which followed were framed, following advice from national partners and local leaders, around conceptions of the good life. Groups covered the activities, assets, characteristics and causes of wealth and poverty in communities. The group setting provided a format for understanding relevant issues that household surveys cannot easily capture, including gender dynamics, religion and spiritual practices and politics. Groups, and interviews, also addressed intra-household dynamics which was important because it was felt that surveying more than one member of each household would lead to distrust in the communities where ongoing ecological monitoring and further social science research was being conducted. Finally, participants shared their perceptions and aspirations for the future of their communities. Interviews followed a similar structure, although adapted for context. Extensive notes were taken by the research team, which was composed of at least two researchers per focus group or interview, at least one of whom was fluent in the local languages and translated where necessary. The qualitative data were analysed using standard qualitative techniques of memoing and coding (Miles and Huberman, 1994).

2.3 Household Survey - Dimensions and Demographics

The household survey quantifies different dimensions of poverty at the household level. Because a central focus of this paper is the extent to which income from agriculture can alleviate household poverty across multiple dimensions, in the quantitative research we focus our attention on the links between income from cash crops and different dimensions of poverty.[2] These dimensions were identified and selected both from the literature (e.g. multi-dimensional poverty index[3]), to provide some level of standardisation and comparability, and focus groups, to take account of local perceptions of poverty and the local context. Indicators representing seven dimensions of poverty were ultimately chosen that reflect structural poverty; these are listed in Table 1. This list represents a compromise between capturing the full complexity and variety of multi-dimensional poverty and a reduction of such complexity for analysis and communication, and indicators that are relevant for both individuals and policy-making processes (Jones and Tanner, 2016). Although indexing, using aggregated data from multiple indicators, is widely used to paint broad pictures, indexes can lack transparency. For example, whether complex methods are used to construct an indicator, or whether simple methods are used, such as weighting indicators equally, indexes are likely to be arbitrarily biased (Decancq and Lugo, 2013). We, therefore, report on one specific indicator within each broad category of poverty. The 'cost' of such an approach is that it is impossible to capture the richness that dimensions encompass. To address this short-coming, we draw on the qualitative data and analysis to create a fuller picture of the complexity.

[2] Although income and land data from household surveys are frequently proxied by assets and expenditure, it was felt that such proxies masks the causal link between poverty and agriculture and therefore respondents were asked about the income and land directly. After piloting the survey in both countries, direct and simple questions concerning land income were preferred to methods using beans and counters which generally caused confusion. Enumerators (trained and fluent in local languages) were permitted to assist respondents with calculations to derive income from crop produce where required. Although the actual numbers and outputs should be interpreted with great care using this approach, the general trends which are revealed are still informative.

[3] See www.ophi.org.uk

To compare across these different dimensions of poverty for households belonging to different cash income quartiles, a standardised score is used. For discrete data, such as whether the household head is literate, '1' represents either access to or achievement of a particular indicator. The mean score for each quartile represents the proportion achieving or accessing that indicator. Thus if a cocoa income quartile has a mean score of 0.5 for TV ownership, then 50% of respondents in that quartile own a TV. For continuous data, such as land holdings, 1 represents the maximum value in the sample. In every case a higher value corresponds to a "less poor" outcome. The final list of indicators used from the household survey in Table 1 includes a description of the way the data were treated and transformed for analysis.

To explore the relationships between cash crop (cocoa and coffee) incomes and multi-dimensions of poverty, we used a generalised linear modelling framework (GLM). We grouped all households into cash crop income quartiles and treated the data as categorical for analysis to allow for errors in recall by survey respondents. In each model, the indicator for the particular poverty dimension is the response variable and income quartile the predictor variable. While dimensions of poverty may have interactive effects, we were specifically focusing on the direct influence cash crop income could be having on household poverty outcomes. When the indicator for a poverty dimension is binary (1 or 0) we fit GLMs assuming binomial errors; when the indicator uses a Likert scale (0 to 4) we fit GLMs assuming Poisson errors. In all cases, the ratio of residual deviance to residual degrees of freedom is <2, showing that our data conform to the assumptions of the error distributions used. We then calculated Tukey Honest Significant Differences to compare the significance of poverty dimension outcomes between each quartile. GLMs were fitted in the statistical programming language R (R core team, 2008). Differences in mean income and land between gender, age and ethnicity groups are tested using ANOVA. The results are organised around the three categorisations outlined in the introduction: individual-structural; individual-stochastic and communal-structural.

Table 1. Dimensions and Indicators of poverty used in this study. The final column summarises the data and how they were transformed into a standardised score between 0-1 for each respondent. (▫ = individual-stochastic; ◊ = communal-structural; ◦ = individual structural)

Dimension	Indicator	Data treatment
Income	Stated cocoa/coffee income▫	Continuous variable. Standardised score created by dividing responses by the maximum value in the sample.
Health	Under-5 mortality◊	Binary variable. 1 means the household has not ever experienced.
	Perceived adequateness of access to health care◦	4 point Likert scale in response to question 'Does the household have adequate access to healthcare?' Higher numbers correspond to agreement. Standardised score created by dividing scores by maximum value in the sample.
Education	Household literacy◦	Binary variable: 1 means the household head is literate.
	Child missed school in the last year▫	Binary variable: 1 means the child has not missed school, 0 means the child has missed school because household could not afford costs.
Basic needs	Electricity◊	Binary variable: 1 if household has access to electricity.
	Access to improved sanitation◊	Binary variable: 1 if household has access to improved sanitation (separates faeces from human contact)
	Access to clean water◊	Binary variable.:1 if household has access to clean drinking water within 30 minute walk.
Assets	Total Land◦[4]	Continuous variable. Standardised score created by dividing responses by the maximum value in the sample.
	TV◦[5]	Binary variable|: 1 if the household owns a TV.
Satisfaction	Satisfaction with life overall▫	4 point Likert scale. Higher numbers correspond to high satisfaction. Standardised score created by dividing scores by maximum value in the sample.
Food security	Adequate amount of food in the last year▫	Binary variable: 1 means the household had 0 months without enough food. (Respondent self-assessment).
	Adequate variety of food in the last year▫	Binary variable: 1 means the household had 0 months without an adequate variety of food. (Respondent self-assessment).
Empowerment	Could easily access more land◦	4 point agree-disagree Likert scale in response to statement 'I could easily get access to more land if I wanted to'. Higher numbers correspond to agreement. Standardised score created by dividing scores by maximum value in the sample.
Social connectedness	Access to extension in the last 2 years◦	Binary value. 1 means the household had received (state or private) agricultural extension/training in the last 2 years.

Demographically disaggregating data provides insights into the role the social categorisation plays in shaping the relations which underpin poverty. Although there are wide range of potential options for demographically disaggregating poverty data, here we consider three widely considered to be important: gender, age and ethnicity (Daw et al., 2011). We analyse differences in income (stochastic poverty) and land (structural poverty), the key overarching dimensions of poverty under consideration, across these groups. To simplify the analysis, respondents' ethnicity was reduced to whether they were autochthonous (indigenous/local) or heterochthonous (non-indigenous/foreign).

[4] Access to land is not included in section 3.2 with the other dimensions due to endogeneity, but is addressed in section 3.3.

[5] TV was selected as an assets indicator because a Principal Component Analysis (PCA) showed that of all the assets it was the most correlated with all other potential "asset" indicators (see supplementary materials S1 for PCA Component Matrix). Conducting the same analysis with an index of assets does not yield different results so TV was chosen for consistency of having non-indexed indicators across dimensions.

During the research process the qualitative and quantitative components informed each other iteratively. The results section of this paper begin with a summary overview (section 3.1), then describe the quantitative findings (section 3.2 and 3.3) before insights from the qualitative analysis are provided (section 3.4).

3 Results

The results are described in four sections. The first provides an overview of the household survey data to contextualise subsequent results, the following sections draw primarily, but not exclusively, on the quantitative analysis to examine the link between cash-crop income and multiple dimensions of poverty (section 3.2) and the demographic disaggregation of cash-crop income and access to land (section 3.3) before drawing on the qualitative analysis to enrich the findings, particularly focusing on the contrasting perspective it provides on the case. In reporting the results we refer to Ghana and Ethiopia as shorthand for the respective cases being described rather than asserting that these findings represent the whole of these countries.

3.1 Overview

Table 2 provides an overview of the summary statistics for households in both Ethiopia and Ghana. While both landscapes are dominated by smallholders, there are also relatively large farms (up to 45 ha). Farmers grow coffee/cocoa on 60-70% of their land on average, indicating that farms are relatively diversified across cash and home consumption. More than 90% of households surveyed in both countries derive some income from cash crops, reflecting our fieldwork location choices. Households also typically pursue multiple income-generating activities. On average cash crops contribute between 45% (Ghana) and 54% (Ethiopia) of total income, compared to other important activities such as livestock rearing, each of which provide less than 10% of total household income on average. These summary data demonstrate how the binary framing of many agriculture-development debates masks the heterogeneity of actors and activities.

Table 2. Summary statistics from Ethiopia and Ghana.

	Ethiopia (Coffee)	**Ghana (Cocoa)**
Mean age	44 (S.E. 1; Min. 18 , Max; 90)	48 (S.E. 1.4, Min. 22, Max. 91)
% female headed households	15%	33%
% household heads married	84%	76%
Mean household size	5.33 (S.E. 0.1, Min 1, Max 12)	9.59 (S.E. 0.56, Min. 1, Max. 38)
Ethnicity	80% Oromo (autochthonous); 17% Amhara	29% Fanti; 17% Assin (autochthonous); 17% Krobo 14% Ashanti;
Under 5 mortality	10% households experienced	17% households experienced
Basic needs (water, sanitations, electricity)	16% all needs met 81% some needs met 3% no needs met	56% all needs met 41% some needs met 3% no needs met
% household heads literate	67%	54%
Mean total land (ha)	2.54 ha (S.E. 0.2, Min 0.75, Max 46.7)	4.60 ha (S.E. 0.4; Min. 0, Max. 24.85)

Mean coffee/cocoa land (ha)	1.50 ha (S.E. 0.2, Min. 0, Max, 45) 60% of total land	3.28 ha (S.E. 0.3; Min. 0, Max. 21.45) 71% of total land
Mean stated yield (kg/ha)	660 (S.E 30; Min. 0, Max 2400)	305 (S.E. 25; Min. 0, Max. 1186)
% households getting income from coffee/cocoa	93%	97%
Mean % income from 3 most important sources	1. Coffee - 54% (S.E. 2) 2. Daily labouring (coffee) 6% (S.E. 1), 3. Rearing livestock 6% (S.E. 1)	1. Cocoa - 45% (±3% S.E.) 2. Annual crop farming - 8% (±1 S.E.) 3. Petty trading - 6% (±1 S.E.)
Mean number of income sources	3.1 (S.E. 0.1, Min. 1, Max. 11)	5.1 (S.E. 0.2, Min. 2, Max. 11)

3.2 Cash crop income and different dimensions of poverty

Figures 2a and 2b show how indicators of poverty vary between cash-crop income quartiles (For results table showing differences between each quartile see supplementary material S2). “High” represents households in the top quartile for cash income from cocoa (Ghana) or coffee (Ethiopia). Conversely “low” represents the bottom quartile. Thus if we consider food security in our Ghana sample (Figure 2a), we can see that those households in the “high” quartile for cash crop income are also the least poor in terms of food security. In contrast, the “high” income households are the most poor in terms of sanitation. For the subjective indicators, such as perceived adequateness of access to health care, monetary wealth might be associated with raised expectations and therefore the difference between groups may be reduced.

We cluster these dimensions according to the framing which distinguishes stochastic (short-term) elements of poverty, structural (long-term endowment), and those which largely depend on communal infrastructure provision. We recognise that these differences overlap in many cases, for example, where payment is required for water or electricity or education; or where children attending school depend on both the communal provision of school places and the ability of households to meet the daily, termly and yearly costs. However, this disaggregation tempers the analytical complexity that is introduced by examining multiple dimensions.

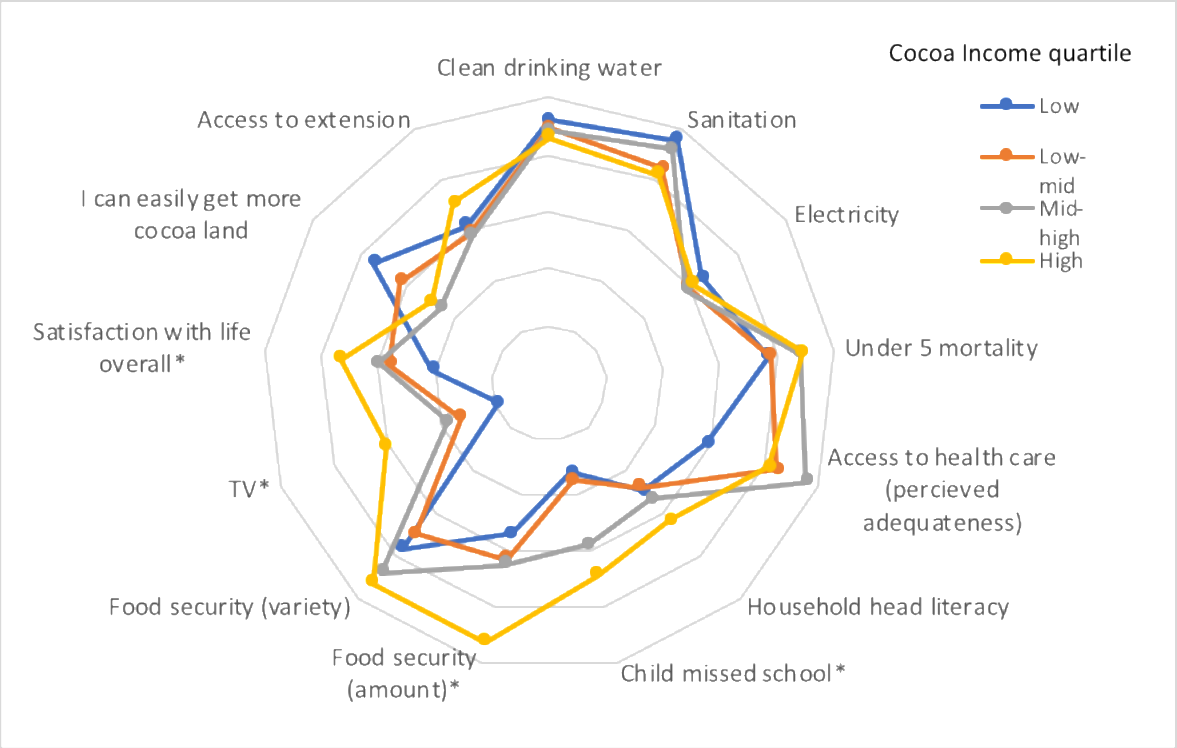

*Figure 2a. Ghana: Poverty indicators (indexed) across cocoa income quartiles (Middle of radar is poorer, outside is richer). * = difference between quartiles is significant p <0.1.*

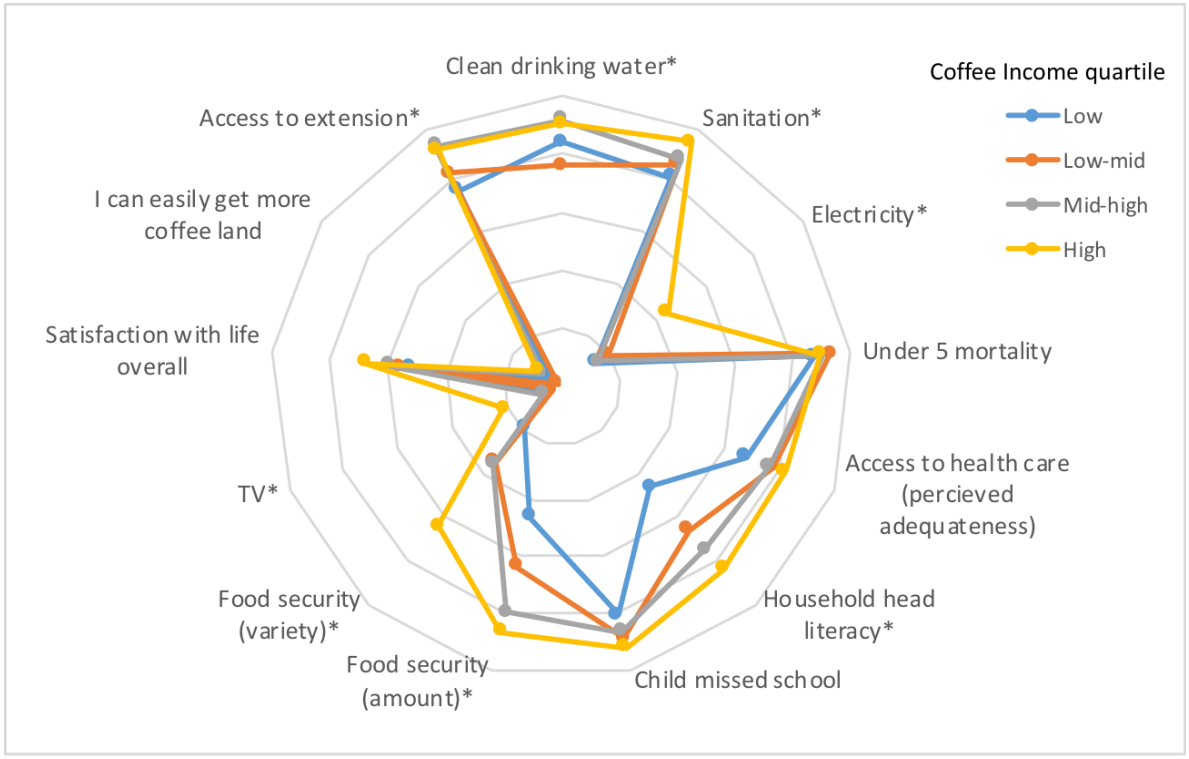

*Figure 1b. Ethiopia: Poverty indicators (indexed) across cocoa income quartiles (Middle of radar is poorer, outside is richer). * = difference between quartiles is significant p <0.1*

3.2.1 Communal structural dimensions

Basic needs (drinking water, sanitation, electricity)

In Ghana, cocoa income does not appear to significantly enhance access to basic needs. The lack of difference in the basic needs indicators across the four crop income quartiles is most likely due to the communal provision of these services, and the relative affordability of payments where relevant. For example, a nominal 10 pesewas[6] per use charge is in place for boreholes in several communities which is used to cover maintenance costs. Only a small number of households (based in remote areas mentioned having to use unclean water. Access to electricity depends on both a physical connection to a power source and the ability to pay for the energy. In our sample several of the villages surveyed had no electricity, there was no solar power in the area, and only 2% of respondents had a generator. Thus for most households it is simply not possible to access electricity.

In Ethiopia, there are significant differences between coffee income quartiles and access to clean drinking water, sanitation and electricity. Our interviews confirmed that only those households in the highest quartile for coffee income consistently have access to electricity. In communities that are connected to the grid, electricity is provided on a house-by-house basis with a connection fee. 5% of respondents had solar power and just one respondent had a generator. While in Ghana access to electricity depends largely on location and income determines the amount of electricity a household uses, in Ethiopia income as well as location determine access to electricity. Our findings further suggest that higher income households have better access to clean water and sanitation. In Ethiopia there is less communal provision of facilities such as toilets and wells, especially in rural and remote areas.

Health (Under 5 mortality; perceived adequateness of care)

In both countries there was no statistically significant difference between quartiles for under 5 mortality prevalence, although in Ghana higher income households in the survey on average experience better outcomes. Respondents' perceptions concerning the adequateness of their access to a health centre shows that higher incomes generally correlate with better perceptions of access to a health centre, with findings in Ghana being significant. In Ghana, the 3rd highest quartile of income scored the highest in this respect which may reflect the spatial dimension of access to health centres, with remote areas being less accessible. Cash income may enable people to afford transport, but only if it is available. In villages where someone owned a vehicle, focus groups said that in an emergency the owner would take someone (often a mother in labour) to hospital, if they were available.

3.2.2 Stochastic dimensions

Education (child missed school)

For both Ethiopia and Ghana, households in higher crop-income quartiles have better outcomes with respect to children missing school (i.e. children in higher income households miss school less), though this is only statistically significant for the Ghana sample. Although in both countries primary education is free, households incur costs associated with uniforms, food and learning materials. In Ghana, interviewees reported that exam fees in particular, which are not charged in Ethiopia, were often unaffordable.

[6] About 2 US cents (100 peswas in 1 cedi).

Food security (variety and quantity)

In both country samples, food security is positively correlated with cocoa or coffee income quartile. Cash income from cocoa and coffee farming enables households to purchase food. Further, in Ghana, food crops are grown when cocoa land is being established to shade seedlings, and for many households their food crop strategy is predicated on an expansion of cocoa. However, as land is becoming increasingly scarce (Amanor, 2010) and fewer areas are being planted or re-planted, more permanent food crop fields are being established. Exactly how the growing land constraint will shape household decision-making about strategies concerning growing subsistence food crops vis a vis growing cocoa requires further work to fully understand, but is important in light of research suggesting that areas where cocoa and coffee is suitable may shift under climate change (Davis et al., 2017; Davis et al., 2012; Läderach et al., 2013; Moat et al., 2017; Schroth et al., 2016).

In Ethiopia, where Coffea arabica is a native species and is cultivated by thinning existing shade and increasing the density of coffee shrubs, food crops are grown predominantly on non-forested land. However, some respondents raised concerns that the arrival of non-coffee farmers in the area meant that forest was being cleared for food crops and chat. Among concerned respondents, this conversion was perceived as a waste of land and a loss of an important source of income. Having more cash income from cocoa or coffee further means households can typically access a greater variety of food, if present in the market.

Satisfaction

In Ghana, higher cash incomes are correlated with higher satisfaction with life overall. In Ethiopia, high income quartiles also report higher satisfaction with life, but the finding is not statistically significant. This challenges assumptions that cash wealth is only important for material wellbeing, such as access to assets, and highlights the impact of cash as a means for households to achieve their goals in a variety of spheres of life. Evidently, it is important to neither neglect the importance of cash in understanding poverty nor equate money and poverty.

3.2.3 Individual Structural dimensions

Assets (TV)

In both countries, higher cash incomes correlate with non-land assets (TV ownership). Unlike health and education which are dependent on public provision in these communities, the ability to acquire assets such as a TV is closely linked to cash income.

Empowerment (can easily get more cocoa/coffee land)

We proxy empowerment with the ability to get more land because it is an indicator linked closely to cocoa and coffee farming. In Ghana land is becoming increasingly commodified, and previously symbolic payments made to traditional authorities are increasing reflecting a market price for land (Amanor, 2010). In Ethiopia, buying and selling land is formally prohibited, but is informally reported. As one interviewee reported: ‘It is possible to get land here, if you have money. But you can’t get land from the government easily. There is a kind of renting system, which can only be for five years at a time, but there is a kind of informal renewing system (which makes it permanent).’ Our data suggest no significant differences between quartiles for either country. In Ghana households with lower incomes perceive that they could access more land more easily. And in Ethiopia, the clustering of households towards the middle of the radar reflects the difficulty all households have in acquiring

land. Other dimensions of empowerment may be more closely aligned to cash income. A more nuanced and focussed assessment would be required to draw firm conclusions for this dimension of poverty.

Social connectedness (access to extension)

As for empowerment, we choose a proxy for social connectedness that is closely linked to farming, in this case 'access to extension'. In both countries higher crop incomes correspond to better access to extension, but the difference is only significant in Ethiopia. In Ghana, more than 60% of farmers had never seen an extension agent and interviewees noted that extension officers charged (2 cedis[7]) if farmers wanted to meet them. Debates concerning the priority of extension services between targeting poorer households (who might benefit most from yield increases) or wealthier farmers with more land and capacity to adopt new practices is a key policy question in both countries.

Education (household head literacy)

Differences in literacy of the head of the household are statistically significant for Ethiopia, that is, those with higher crop incomes are more likely to be literate. Poorer farmer literacy may translate into lower crop income, perhaps through the use of inferior agricultural techniques. The link between household head literacy and income may be due to literacy enabling farmers to engage more with training and using inputs correctly.

3.3 Demographic disaggregation

Cash-crop land and income data are compared across gender, age and ethnicity (Table 3).

Table 3. Stated coffee/cocoa-crop land and income across different demographic groups, data from household survey *(For reference, 2 US$/day is approximately 6400 birr/yr in Ethiopia and 1000 cedis/yr in Ghana. Median age is 49 in Ghana and 43 in Ethiopia).*

		Ethiopia			**Ghana**	
		Mean coffee land (ha)	**Mean coffee income** (birr/yr)		**Mean cocoa land** (ha)	**Mean cocoa income** (cedis/yr)
Household head Gender	Male	1.6 (± 0.2)*	10430 (± 1377)*		3.9 (± 0.4)*	3153 (± 397)*
	Female	0.7 (± 0.1)*	4963 (± 1403)*		1.9 (± 0.3)*	987 (± 210)*
Age	Below median	1.7 (± 0.4)	10449 (± 2078)		2.8 (± 0.3)*	1736 (± 274)*
	Above median	1.3 (± 0.2)	8816 (± 1198)		3.8 (± 0.5)*	3167 (± 504)*
Ethnicity	Autochthonous	1.5 (± 0.3)	8259 (± 2714)*		3.0 (± 0.4)	2462 (± 341)
	Heterochthonous	1.6 (± 0.3)	15173 (± 1323)*		3.4 (± 0.5)	2433 (± 531)

*Sig. diff at $p = \leq 0.10$

The most consistent finding concerning demographics is that while female headed-households do have access to cash-crops, they have access to significantly less land for cash-crops (data for total land holding not shown but is also significantly different) and have significantly lower incomes from cash-crops than male-headed households. This finding is consistent with the general pattern of access to land globally, that women have less access to land (FAO, 2011). Further analysis suggests (non-significantly) that in general female-headed households are more likely to be engaged in

[7] Approximately 0.45 USD.

growing food crops, for sale and subsistence, than men. Other key activities include earning cash income from preparing food and drink and daily labouring.

Labour has been a critical avenue for women (and children) to access land in cash-crop systems, with women in Ghana claiming land is owed to them for their labour efforts as 'sweat-equity' (Quisumbing et al., 2001). However, this customary mechanism of land acquisition does not guarantee women access to land. And although formal laws[8] recognise the inheritance rights of women and children these are only patchily adhered to and customary norms, which do not consistently recognise the rights of women to land, continue to dominate the distribution of land (Evans et al., 2015).

In Ethiopia, there was a high degree of reticence to talk about land issues, but one woman shared that she had purchased land from a very poor person who needed money to repair her house and meet educational costs. Another, who believed that her attempts to establish a coffee farm were being sabotaged indicated that her difficulties were related to both her position as a female-headed household, and also to her ethnicity. It is difficult to draw general conclusions with a paucity of data, but there may in Ethiopia be a systematic and structural disadvantage against women that interacts with other drivers of poverty.

The findings for age are different in the two countries. In Ghana, it is sometimes claimed that the youth are un-interested in cocoa farming (COCOBOD, 2015). However, qualitative interviews with young farmers[9] and discussions in focus groups suggest that the symptom of dis-interest may be driven, at least partly, by land scarcity rather than aspirations for urban life. Cocoa is also viewed by some cocoa farming families as a means to further children's education, and investment in education is among the most frequently cited benefits of having a cocoa farm. A more nuanced assessment of the situation suggests that many of the youth who grow up in cocoa communities are encouraged to leave farming through education and youths who either remain in cocoa communities or arrive as seasonal labourers struggle to access land even though, given their circumstances, they would like to farm cocoa.

In Ethiopia, key informants shared a similar narrative concerning the youth and undesirability of agriculture, and noted that combined with challenges regarding the availability of land and unemployment, the issue underpins the country's drive for industrialisation. It is not possible to generalise from this sample to the wider region or national context, but our data suggest that younger farmers may have (non-significantly) more land and higher incomes, raising questions about validity of the general narrative. During interviews, some respondents noted that farms in the area are becoming increasingly small over time as land is passed from one generation to the next. Such fragmentation may harm the potential of the sector, but obtaining accurate data on land holdings is tricky. Land has been co-opted into political, social and economic narratives, and contributes to local taxation, thus it is treated with considerable secrecy

There are no statistically significant differences between land across ethnicities in the Ethiopian data. Exploring differences across ethnicities in the income data is challenging because of the current political situation. However, ethnically-orientated discontent in the area was discussed in private and informal conversations, and there are historical antecedents to such dynamics.

[8] Specifically, the Intestate Succession Law (PNDCL 111).
[9] Young farmers here refers to farmers in the ~18-30 age group who have left school but usually have not married or had children.

In Ghana, the country's democratic transition has largely avoided being shaped along ethnic divisions. The non-significant differences in land and income between ethnic groups were reflected in the low importance that the issue appeared to occupy in focus group discussions and interviews. However, land tenure arrangements were discussed, and respondents generally felt that autochthons are systematically favoured, because they do not pay rent or sharecrop, compared to most heterochthons who share between one- and two-thirds of their crop with their landlord, or pay rent. Although these general characterisations were discussed, detailed discussions revealed a much more complex situation with a great variety of arrangements existing between individuals with no universal or general patterns based on ethnicity.

Distilling poverty dimensions into meaningful indicators and demographically disaggregating data is challenging, particularly for dimensions such as social connectedness, satisfaction and empowerment. Using a mixed methods approach facilitates discussion of poverty and wealth in which are more easily shaped by participants than those, such as the household survey in this research, which was rooted in a particular approach (multi-dimensional poverty). The following section reports on the semi-structured interviews and focus groups and highlights main points of discussion and departure from the quantitative analysis.

3.4 What does it mean to be poor? Contrasting perspectives

Much of the discussion in focus groups and interviews resonated with *a priori* assumptions regarding poverty and wealth, with issues such as health, education, meeting of basic needs and food being given primary importance, often framed as being able to provide for your family. As noted in Section 2, these discussions informed the selection of dimensions and indicators for the quantitative analysis. We focus here on dimensions and dynamics of poverty that were raised but have not yet been addressed, and highlight key points of divergence from the preceding analysis, particularly the importance of supra-household issues. Findings are discussed from Ghana and then Ethiopia.

One major divergence that groups in both countries raised was the suitability of conventional key indicators of poverty. In Ghana, female respondents in particular noted how assets are a poor indicator of poverty, arguing that radios, TVs, cars and clothes can be purchased on credit and that many of the poor were indebted. Rather, rich people were involved with multiple ventures, had large, well-managed farms, quality housing and could educate their children well, often sending them to private school.

As well as being indebted, the poor were identified as having poor physical health, being unable to care for their families (see above), having little or no land, and working mainly as daily labourers, unable to attend social functions, and that these aspects of poverty endured across generations. As well as cocoa being a source of income in households and communities it plays another fundamental role in wellbeing, with considerable pride and social status being attributed to being a cocoa farmer. Although much of the work on poverty in agricultural settings examines technical agronomic practices to increase yields and ways in which to encourage their uptake, focus groups rarely raised issues such as lack of labour, inputs and agricultural knowledge. Rather respondents highlighted concerns such weak local leadership, community members discouraging each other, back-biting and gossiping, and political divisions as key issues facing the community in harnessing agriculture for increasing wellbeing.

In Ethiopia, focus groups challenged the assumption that coffee land was a relevant measure of wealth. As one female respondent noted: 'People always say coffee makes us rich, but it doesn't. If you can't manage it well you will be poor'. Combined with the assertion that you cannot become

rich through daily labouring alone, it would appear that coffee land is a necessary but insufficient asset for being or becoming wealthy. Groups noted that poor management was only partly related to the affordability of labour with respect to other household costs such as education, health-care and food. A lack of price differentiation for quality coffee was widely cited as discouraging farmers and undermining their pride in coffee farming. As well as uniform pricing reducing the potential income from coffee at both a local and national level, farmers noted how this compounded dis-satisfaction with work and demoralised communities. Women in particular noted how this was manifest as a psychological burden for them since they are primarily responsible raising and caring for children and they often worry about the future.

Reflecting discussions in Ethiopia, respondents made a connection between poor community relations and poverty, in particular between farmers, coffee traders, many of whom operate informally, and co-operatives. Despite co-operatives being central to the delivery of the country's Growth and Transformation Plan, only 26% of survey respondents were members[10]. The reluctance of farmers to join co-operatives appears to be rooted in widespread mistrust of leaders, who are perceived by some farmers to be corrupt and stealing dividends. As some interviewees mentioned, this is further compounded by widely held negative perceptions of co-operatives because of the connotations associated with communal labour groups under the oppressive socialist Derg regime that ruled Ethiopia between 1974-1987. Informal arrangements regarding land were also noted by government officials as a source of conflict which undermined coffee production and thus contributed to households' poverty. Households and local policy-makers commented that poor social relations can result in land being sabotaged, such as by damaging coffee trees or ploughing vertically on slopes to promote soil erosion, by discontented individuals.

The perspective offered by a qualitative investigation illustrates the complexity of poverty dynamics and highlights the multifarious nature of the link between agricultural yields (and efforts to increase them) and poverty when broadly conceptualised and situated in people's lived experience. The following sections reflect on the implications of these findings on poverty-agriculture debates.

4 Implications for poverty-agriculture debates

Enthusiasm for sustainably increasing agricultural incomes and yields is growing because it ostensibly addresses ecological, economic and social challenges, including poverty. This paper demonstrates that while income is critical for several components of poverty such as assets, other key aspects such as education and health are only partially contingent on income. Rather, the achievement of wellbeing in these dimensions is contingent on communal provision (by the state or market) of services and infrastructure, as well as the institutional, spatial and social barriers which determine people's ability to access services. This finding echoes the literature on entitlements (e.g. (Leach et al., 1999; Sen, 1981) and access (e.g. (Ribot and Peluso, 2003). Appreciating the complexity of the link between cash-crops, income and other dimensions of poverty cautions against embracing income increasing strategies alone as a means of alleviating poverty (Beuchelt and Zeller, 2011), yet the relationship between income from cash-crops and several dimensions of poverty cautions against marginalising the importance of addressing yield-gaps in agriculture and poverty debates, as, for example, may happen if policies are focused on promoting industrial and large-scale agriculture.

[10] Co-operatives in Ethiopia, regulated by Ethiopian Law 147/98, are heavily promoted as a means to increase farmers yields, incomes and deliver benefits by pooling their resources to support collective service provision and economic empowerment, in particular with support for marketing

Disaggregating income and access to land along key demographic variables highlights the prevalence of trade-offs in the pursuit of poverty reduction through income and yield gains. In particular, households (especially female headed-households and women in general), who have access to less land, would benefit less from efforts to increase incomes through increasing yields than those with more land. This is especially the case if, as suggested by a representative of an international NGO in a workshop in Ghana, that farmer engagement programmes should, in pursuit of efficiency, focus on large farms. The signals associated with other demographic factors considered here (age and ethnicity, which might be associated with varying size of land holdings or access to extension for example) are not consistent, highlighting the need for the consideration of specific contextual considerations in policy discussions. This might include, for example, an assessment of the distributional impacts of investing in extension programmes or infrastructure in particular places.

Augmenting the structured and quantitative assessment of multi-dimensional and demographically disaggregated poverty with a qualitative assessment of local perceptions poverty and the barriers to poverty alleviation draws attention to easily overlooked issues. In this case, respondents highlighted the quality of local governance, issues of trust within communities, and how the wider political context (e.g. conflict or land tenure) shapes farmers' possible actions. They also questioned the utility of standard poverty variables. These issues re-inforce the importance of balancing large-scale quantitative assessments with context-specific consideration of the relevant social relations. An awareness of these issues could nuance policy responses that implicitly assume income defines poverty and that therefore poor yields and farm management are central to addressing poverty. Instead, a broader understanding of what actually constrains and enables farmers is required. A further consideration, which is beyond the scope of this paper, is that focussing analyses at a farm-level draws attention away from the macro-scale structural issues that also play a key role in mediating the link between cash-crop production and poverty alleviation.

In addition to recognising the limitations of a farm-scale analysis, an appreciation of the relational components of poverty (Green and Hulme, 2005; Mosse, 2010), such as gender inequality, highlights the finite scope of policy interventions to address issues concerning some of the key social relations underpinning poverty. The persistence of such issues demonstrates that they are not easily amenable to policy levers. However, there is some evidence that policy can influence the evolution of customary norms and social relations. In Ghana, for example, although the Intestate Succession Law (PNDCL 111) specifying the rights of wives, children and extended family should have to land should the husband die is not widely followed (Quisumbing et al., 2001), Evans et al. (2015) suggest that it has been associated with a shift in customary inheritance practices. Progressive policies may have limited direct impact, but are still essential for addressing poverty.

Recognising that policy only has an indirect influence on some of the social norms that underpin certain dynamics of poverty points towards the necessity of acknowledging the prevalence of trade-offs and that determining approaches to agricultural development strategies involves moral and political choices. The risk that top-down attempts to pursue intensive agriculture (and other development projects) often fail and can exacerbate the plight of the poorest is widely noted (Dawson et al., 2016; Scott, 1998). A better understanding of the complexities of livelihoods in cash crop systems means, as Struik et al. (2014) argue, greater clarity concerning the assumption, norms and values involved in navigating the trade-offs entailed in sustainable intensification is essential for generating solutions that are acceptable to both the scientific and policy communities as well as people that they work with.

5 Concluding remarks

As Harris and Orr (2014):93) note, reflecting on the potential of rain-fed agriculture to alleviate poverty, 'the rhetoric of poverty reduction is rich in imprecision'. Words such as 'sustainable intensification' and 'agricultural development' are *de rigueur*, but they deflect attention away from what might be *actually done* in their pursuit (Cornwall, 2007). An examination of poverty, conceived as a multi-dimensional, demographically disaggregated and relational phenomenon, in cash crop systems reveals the complexity involved in the pursuit of poverty alleviation through agricultural intensification. Questions concerning who receives what benefits, and how, through the different approaches to agriculture-led poverty alleviation are frequently marginalised, obscured by the complexity of people's lived experiences and the analytical simplicity of reducing poverty to a lack of income.

Although cash crops are an essential component of livelihoods in the study areas, the findings here indicate that focusing exclusively on increasing incomes by increasing yields of cash-crops will not necessarily have a predictable or progressive impact on wellbeing. Variable state and private approaches to the provision of services and infrastructure, the nature and size of land holdings, the quality of local governance and social relations concerning, *inter alia*, gender, age and ethnicity all shape the potential poverty alleviating outcomes of various approaches to agricultural development.

This research highlights the importance of a methodology that incorporates both quantitative and qualitative data collection that provides scope for research participants to influence the research agenda and facilitate both a broader view of the contexts in which debates concerning poverty and agriculture are situated as well as a finer-grained understanding of local contexts.

As Ghana and Ethiopia, and other countries, grapple with strategies to both reduce poverty and sustainably increase yields, the attention of policy-makers and those that support them needs to remain on the prevalence of trade-offs, the reciprocity of state and private actions in achieving poverty alleviation and the indirect nature of policy interventions on some of the fundamental social relations underpinning poverty dynamics within communities.

Acknowledgements

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